NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

FENCE

(Ft.)

CODE 382

DEFINITION

A constructed barrier to animals or people.

PURPOSE

This practice is applied to facilitate the application of conservation practices by providing a means to control movement of animals and people.

Applicable purposes include, but are not limited to:

- Improving distribution and timing of livestock grazing.
- Reducing erosion and improving water quality by controlling livestock access to streams, springs, wetlands, and ponds.
- Facilitating handling, movement, and feeding of livestock.
- Protecting newly planted areas from disturbance until established.
- Protecting sensitive environmental areas and their flora from vehicular, pedestrian, or animal traffic and use.
- Protecting the safety of people, livestock, and wildlife by limiting or denying access to hazardous areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on any area where management of animal or people movement is needed. Fences are not needed where natural barriers will serve the purpose.

CRITERIA

General Criteria Applicable to All Purposes

Fencing materials and type and design of fence installed shall be of high quality and durability. The type and design of fence installed will meet the management objectives and topographic challenges of the site.

Fences shall be positioned to facilitate management requirements. Boundary and roadside fence design and installation shall follow federal, state, and local laws and regulations.

Height, size, spacing, and type of materials will be used that best provide the needs for the style of fence required and are best suited to the topography.

Cultural resources will be considered when planning this practice. This practice has the potential for adversely affecting cultural

resources and compliance with General Manual 420, Part 401, during the planning process.

The fence design will consider topography, soil properties, aesthetics, human access type, safety, and management of livestock, moisture conditions, wildlife movement, durability of materials, flooding, and stream crossings.

Fences across gullies or streams require special braces and designs. Breakaway fences or swinging water gaps allow debris and water to flow past the fence line without destroying the fence adjacent to the stream or gully. Swinging or floating water gaps should span running streams.

Place wood line posts in dips and on rises, then follow recommended spacing for different fence types. Tie off wire to a brace if the dip is 3 feet or deeper.

Post spacing in shallow soils may vary with additional stays installed to maintain post spacing. Use a probe to locate desirable post sites.

If treated posts are cut off, coat with pitch.

All electric fences must be grounded to ensure proper flow of electricity. Lightning arrestors or spark gap shall be installed to limit damage to charger, fence, and nearby objects and injury or death to animals and people.

Electric fences must have access to a dependable power supply, main line, solar power panel, or easily exchanged and properly sized deep cycle batteries.

Electric fences must have adequate shocking power for the animal type being controlled at all points along the fence.

Electric fences will use overhead or underground transmission lines to carry electricity past the gate to the remainder of the fence.

Other fence materials such as chain link, vinyl, plank, or rail will be installed according to manufacturer's recommendations and approved prior to installation.

General Criteria for Property Line and Roadside Fencing (See Table 1 for comparison of typical property line and roadside fences.)

If the property line is in a frequently flooded area where the fence is inundated, install high tensile electric fence.

The minimum permanent non-electrified barbed wire fence for property line or roadside fencing shall be a four-wire fence with posts on 14-foot spacing or 18-foot spacing with a stay located between posts. See the Barbed Wire Construction Specifications for details and options.

The minimum permanent woven wire fence with barbed wire above it shall be 42 inches high. Posts shall be spaced 14 feet or less apart for standard woven wire or 25 feet or less apart for high tensile woven wire. (See the Woven Wire Construction Specification for details and options.)

The minimum permanent electrified high tensile fence shall be a four-strand fence with post spacing of 75 feet or 150 feet with stays at 50-foot spacing between posts. See the Permanent Electric Fence Construction Specifications for details and options.

The minimum permanent non-electrified high tensile fence shall be seven strands

with post spacing of 12 feet or 15 feet with stays between posts. See the Permanent Non-Electric High Tensile Fence Construction Specifications for details and options.

General Criteria for Cross-fencing (See Table 2 for comparison of typical cross fences.)

The minimum permanent non-electrified barbed wire fence for cross-fencing shall be a three-wire fence with posts on 14-foot spacing or 18-foot spacing with a stay located between posts. See the Barbed Wire Construction Specifications for details and options.

The minimum permanent woven wire fence shall be 32 inches of woven wire with two strands of barbed wire above it. Posts shall be spaced 14 feet or less apart for standard woven wire or 25 feet or less apart for high tensile woven wire. See the Woven Wire Construction Specifications for details and options.

The minimum permanent electrified high tensile fence for cross-fencing shall be a single strand with post spacing of 75 feet. See the Permanent Electric Fence Construction Specifications for details and options.

The minimum permanent non-electrified high tensile fence for cross-fencing shall be six strands with post spacing of 12 feet or 15 feet with stays between posts. See the Permanent High Tensile Fence Construction Specifications for details and options.

General Criteria for Flood-prone Areas

When constructing fences in flood-prone areas, use high tensile electric fence with the fewest posts and wires needed to control the animals of concern. Place the bottom wire as high as practical. This type of fencing is acceptable boundary when the property line is in a flood-prone area.

PLANS AND SPECIFICATIONS

Plans and specifications are to be prepared for specific sites. Plans and specifications for installing fences shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve all of its intended purposes. See attached Construction Specifications for Barbed Wire, Woven Wire, High Tensile Electric Fencing, High Tensile Non-electric Fencing, and Temporary Fencing.

CONSIDERATIONS

Where appropriate, local cultural values will be incorporated into practice design in a technically sound manner.

Where applicable, cleared right-of-ways may be established that would facilitate fence construction and maintenance. All necessary erosion control measures will be applied to any cleared areas.

When possible, install fences in locations that will minimize maintenance, avoiding flood-prone areas, irregular terrain such as gullies and/or water crossings, and damage from tree or limbs falling.

Where applicable, clear right-of-ways will be established which would facilitate fence construction and maintenance.

Consider livestock management, handling, watering, shade, and feeding when locating fences.

Determine paddock size needed before cross-fencing is installed. See the

Prescribed Grazing Technical Note for sizing paddocks.

Locate watering facility so fields can be cross-fenced with water accessibility.

Place permanent fences approximately 300 feet apart. Cross-fencing can easily be installed with temporary fencing, if additional paddocks are desired.

Consider placing fences with the landscape, so little interference occurs if land use changes or land is in a rotation.

When planning and constructing a fence on steep slopes, consider soil erosion potential from livestock trailing. When possible, use natural terrain to reduce concentrated flow in potential trailing areas.

Driven posts are typically 70 percent tighter than posts set in an augured hole and tamped in.

Cutting off the top of treated posts may compromise the integrity of the post, so coat with pitch.

A double-brace assembly may be required at ends and corners for fences in poorly drained soils.

Install an induction loop (lightning choke) for added lightning protection.

Although the minimal voltage for control of different species is listed in specifications, the recommended voltage for best control of all animals is 2,000 or more volts.

A ground rod should be installed at electric company's transformer pole (primary ground) and another ground rod installed at the electrical circuit breaker box (secondary ground), if they do not already exist. Contact the electric company for service.

Install switches on different electric fence lines or paddocks to manage voltage and repair.

In flood-prone area, consider suspending high tensile electric fence wire from a ¾-inch or larger tree branch with a 3/8-inch nylon rope. Where practical, tie off HT wire to insulator which is tied to a 6-inch eyebolt in tree for end post.

Consider wildlife movement needs when locating fences.

OPERATION AND MAINTENANCE

Regular inspection of fences should be part of an on-going management program. Inspection of fences after storm events is needed to facilitate the function of the intended use of the fence. For electrified fence, use a voltage tester to ensure adequate charge is being discharged along the entire fence span. Keep heavy vegetation away from fences, especially electric fences, to avoid loss of charge. Cut-off switches will assist in maintenance and repair of electric fences.

Maintenance and repairs will be performed as needed. Retain and properly discard all broken fencing material and hardware to prevent ingestion by animals or injury to equipment, people, or animals. Precautions should be taken to ensure the safety of construction and maintenance crews.

REFERENCES

Gallagher Power Fence Systems, Quality Down the Line.

Gerrish, James R. Missouri Agronomy Technical Note MO-19, Installation of Electrified Hi-Tensile Fence Systems.

Northeast Pasture Management Coordinating Committee. *Pasture Profit Prophet*, Vol. 1 No. 4. Chester, PA 19013. May 1992.

Premier1supplies.com, *Fence Systems, A Guide to Fencing that Works*.

USDA Forest Service. *Fences*. Technology and Development Program. USDI Bureau of Land Management.

TABLE 1: TYPICAL PROPERTY LINE OR BOUNDARY FENCE

TYPE FENCE	TYPICAL WIRE SPACING	TYPICAL TYPE OF WIRE	MAXIMUM DISTANCE BETWEEN PULL ASSEMBLIES	MAXIMUM LINE POST SPACING	MINIMUM LINE POST LENGTH (L) AND DEPTH (D)	RETAIL COST
Barbed Wire	4 or More Wires, 42" high (12, 22, 32, 42)	15.5 Gauge Type III Galvanized	<= 1,320' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	14' Apart 18' with Stays on 9' Spacing	Wood 6' L, 24" D Steel 5.5' L, 18" D	2*
Woven Wire	Woven + Barbed Wires 42" High	12.5 Top and Bottom with 14.5 Gauge for Other or H.T. Woven	<= 330' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	14' Apart Conventional w.w. 25' Apart High Tensile w. w.	Wood 6' L, 24" D Steel 5.5' L, 18" D	4*
High Tensile Electric	4 or More Wires, 42" High (12, 22, 32, 42)	12.5 Gauge 170,000 psi	<= 4,000' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	75' Apart or 150' with Stays on 50' Spacing	Wood 6' L, 24" D Steel, High Density Wood, Fiberglass 5.5' L, 18" D	1*
High Tensile Non-electric	7 or More Wires, 42" High (6, 12, 18, 24, 30, 36, 42)	12.5 Gauge 170,000 psi	<= 4,000' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	12' Apart or 15' with Light Post or Stays Between	Wood 6' L, 24" D Steel, High Density wood, Fiberglass 5.5' L, 18" D	3*

Corner and brace posts shall be 6" minimum and driven or set in the ground and tamped around 36" deep or set in 30" of concrete. Do not use landscape timbers for any part of the fence.

* Cost Ranging 1-4, (1 Least-4 Most).

TABLE 2: TYPICAL CROSS-FENCING

TYPE FENCE	TYPICAL WIRE SPACING	TYPICAL TYPE OF WIRE	MAXIMUM DISTANCE BETWEEN PULL ASSEMBLIES	MAXIMUM LINE POST SPACING	MINIMUM LINE POST LENGTH (L) AND DEPTH (D)	RETAIL COST
Barbed Wire	3 or More Wires, 42" High (22, 32, 42)	15.5 Gauge Type III Galvanized	<= 1,320' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	14' Apart 18' with Stays Between	Wood 6' L, 24" D Steel 5.5' L, 18" D	2*
Woven Wire	Woven +Barbed Wires 42" High	12.5 Top and Bottom with 14.5 Gauge for Other or H.T. Woven	<= 330' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	14' Apart Conventional w.w. 25' Apart High Tensile w. w	Wood 6' L, 24" D Steel 5.5', 18" D	4*
High Tensile Electric	1 or More Wires, 2/3 Hip Height (26"-32")	12.5 Gauge 170,000 psi	No Brace Needed However, Tie off Wire Every 4,000'>	75' Apart	Wood 6' L, 24" D Steel, High Density Wood, Fiberglass 5.5' L, 18" D	1*
High Tensile Non-electric	6 or more wires, 42" high (12, 18, 24, 30, 36. 42)	12.5 Gauge 170,000 psi	<= 4,000' Apart 4" Horizontal Brace 6" Brace and Corner Posts, 7' L	12' Apart or 15' with Light Post or Stays Between	Wood 6' L, 24" D Steel, High Density Wood, Fiberglass 5.5' L, 18" D	3*

Corner and brace posts shall be 6" minimum and driven or set in the ground and tamped around 36" deep or set in 30" of concrete. Do not use landscape timbers for any part of the fence.

*Cost Ranging 1-4 (1 Least-4 Most).